[0019] Further features and advantages of the invention will appear more clearly on a reading of the following detailed description of several exemplary embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] For a more complete understanding of the present invention, reference is made to the following detailed description of several exemplary embodiments considered in conjunction with the accompanying drawings, in which:

[0021] FIG. **1** is a block diagram of a three-dimensional imaging system constructed in accordance with an exemplary embodiment of the present invention;

[0022] FIG. **2** is a schematic diagram of an exemplary embodiment of the three-dimensional display described in FIG. **1**;

[0023] FIG. **3** is a schematic diagram showing that if optical pulses used in FIG. **2** are sufficiently short in duration, then the pulses will spatially overlap essentially at a desired position P**1**;

[0024] FIG. **4** is a schematic diagram showing that pulses from several optical sources arriving at point P**1** at the same point in time that minimizes the spatial spread of the overlapping pulses;

[0025] FIG. **5** is a schematic diagram of an optical mixer moving periodically back and forth along the z axis under the control of display electronics such that optical pulse wave fronts will intersect the optical mixer at different points of successive planes, which provides a mechanism to generate an optical mixer output of the desired optical wavelength (color) at any point in the volume of space that is traversed by the optical mixer;

[0026] FIG. **6** is a schematic diagram of an implementation of a pulsed optical source in which a laser produces a beam of light which is transformed into a cone of light by a concave lens;

[0027] FIG. **7** is a schematic diagram of another implementation of a pulsed optical source in which a point source of light emits light which is transformed by a convex lens into extended beams with plane wave fronts;

[0028] FIG. **8** is a schematic diagram showing how a desired wavelength generator can be shared across three pulsed optical sources;

[0029] FIG. **9** is a schematic diagram depicting an optical mixer constructed from a plurality of smaller optical mixing elements;

[0030] FIG. **10** is a schematic diagram showing that each of the smaller optical mixing elements of FIG. **9** can also include optical mixer sub-elements which are optimized for one of the three primary colors in an RGB display;

[0031] FIG. **11** is a perspective view of optical mixing elements made from a monolithic non-linear optical material depicted as having a cylindrical shape and another optical mixing element depicted as having a truncated conical shape;

[0032] FIG. **12**A is a side view of an optical mixing element that is a combination of a hemispherical lens, a cylindrical non-linear mixing material, and a cylindrical desired wavelength filter;

[0033] FIG. **12**B is an exploded perspective view of the optical mixing element of FIG. **12**A;

[0034] FIG. **13**A is a side view of an optical mixing element that is a combination of a triangular lens, a triangular non-linear mixing material, and a triangular desired wavelength filter;

[0035] FIG. **13**B is an exploded perspective view of the optical mixing element of FIG. **13**A;

[0036] FIG. **14**A is a side view of an optical mixing element that is a combination of a pyramidal lens, a rectangular non-linear mixing material, and a rectangular diffuser;

[0037] FIG. **14**B is an exploded perspective view of the optical mixing element of FIG. **14**A;

[0038] FIG. **15**A is a side view of an optical mixing element that is a combination of a hemispherical lens, a rectangular non-linear mixing material, and a rectangular desired wavelength filter;

[0039] FIG. **15**B is a an exploded perspective view of the optical mixing element of FIG. **15**A;

[0040] FIG. **16**A is a side view of an optical mixing element that is a combination of a rectangular non-linear mixing material, a pyramidal lens, a rectangular desired wavelength filter, and a pyramidal optical reflector which allows one or more pulsed optical sources to be positioned on the same side of an optical mixer as a viewer;

[0041] FIG. **16**B is a an exploded perspective view of the optical mixing element of FIG. **16**A;

[0042] FIG. **17** is a schematic diagram of a mechanical mechanism for moving a planar optical mixer back and forth;

[0043] FIG. **18** is a schematic diagram showing that a optical mixer can be moved using a rotational motion about the X-axis;

[0044] FIG. **19** is a schematic diagram of the optical mixer of FIG. **18** in which additional pulsed optical sources are placed on a side of the optical mixer opposite the side to which the original pulsed optical sources direct optical pulses, such that the pulsed optical sources arrive at the point P1 on the optical mixer at the same time;

[0045] FIG. **20** is a schematic diagram depicting the pulsed optical sources of FIG. **19** in which the pulsed optical sources are successively utilized as the optical mixer rotates clockwise around the X-axis;

[0046] FIG. **21** is a schematic diagram showing that an optical mixer can have other physical shapes in addition to planar;

[0047] FIG. **22** is an exemplary embodiment of the three-dimensional image scanning device described in FIG. **1**;

[0048] FIG. **23** is a schematic diagram of an arrangement for a second source of optical pulses which includes a pulsed optical source and a mirror;

[0049] FIG. **24** is a schematic diagram of an arrangement for a second source of optical pulses in which the mirror of FIG. **23** is omitted and in which the timing of the optical sources is controlled by image scanner electronics;

[0050] FIG. **25** is a schematic diagram showing that the generation and detection of reflected light from a desired object with high temporal resolution will reveal the depth profile of the desired object as a succession of different "slices" of the desired object are captured within the optics of an optical recorder;

[0051] FIG. **26** is a schematic diagram depicting the process of separating spatial information from color information;